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**Chemistry Notes for RRB Group
D and RRB NTPC 2024 Exams**

**Specially for Railways
2024-25 Exams**

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Contact –Shivam Mudgal

Chemistry Notes

Topic –Chemical Bonding

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#Chemical Bonding

Constituents (atoms, molecules or ions) of different elements except noble gases, do not have complete octet so they combine with other constituent atoms by chemical bonds to achieve complete (stable) octet. The process of their combination is called chemical bonding. Chemical bonding depends upon the valency of atoms.

#Types of Chemical Bond

They are divided in the following types depending upon the mode electron transferred or shared electrons or forces of attraction.

- Electrovalent or ionic bond
- Covalent bond
- Coordinate or dative covalent bond
- Van der Waal's forces
- Hydrogen bond

#Electrovalent Bond

- The bond formed by the transfer of electrons from one atom to another is called electrovalent bond and the compound is called electrovalent compound or ionic compound.
- These bonds are formed between metals and non-metals.

- These conduct electricity when dissolved in water and also soluble in water.
- These are insoluble in organic solvents like alcohol etc.

Some Electrovalent Compounds (Ionic Compounds)

<u>Name</u>	<u>Formula</u>	<u>Ions Present</u>
Aluminium Oxide	Al_2O_3	Al^{3+} & O^{2-}
Ammonium Chloride	NH_4Cl	NH_4^+ & Cl^-
Calcium Chloride	CaCl_2	Ca^{2+} & Cl^-

#Covalent Bond

- The bond is formed by the sharing of electrons between two atoms of same (or different) elements, is called covalent bond.
- Covalent bond may be single, double or triple depends upon the number of sharing pairs of electrons.
- Covalent compounds are usually liquids or gases having low melting point and boiling point.
- These do not conduct electricity and are insoluble in water but dissolve in organic solvent.

Some Covalent Compounds

<u>Name</u>	<u>Formula</u>	<u>Element's part</u>
Alcohol (Ethanol)	$\text{C}_2\text{H}_5\text{OH}$	C, H and O
Ammonia	NH_3	N and H
Acetylene (Ethyne)	C_2H_2	C and H

#Coordinate or Dative Bond

- The bond is formed by one sided sharing of one pair of electrons between two atoms.
- The necessary condition for the formation of coordinate bond is that octet of one atom should be complete, having at least one lone pair of electrons and other atom should have a deficiency of at least one pair of electrons.
- The atom having complete octet which provides the electron pair for sharing, is known as donor.
- The other atom which accept the electron pair, is called the acceptor.

#Bonding between A and B is predominantly

- Ionic if there is large difference in electronegativity.
- Covalent if both A and B have approximately same value of electronegativity.
- Coordinate if lone pair on A (or B) is donated to electron deficient B or A.

Compounds Containing Ionic and Covalent Bonds

Name	Formula
Potassium cyanide	KCN
Sodium hydroxide	NaOH
Calcium carbonate	CaCO ₃

Compounds Containing Covalent and Coordinate Bonds

Name	Formula
Carbon monoxide	CO
Ozone	O ₃

Dinitrogen oxide	N_2O
Dinitrogen trioxide	N_2O_3
Nitric acid	HNO_3

Compounds Containing Electrovalent, Covalent and Coordinate Bonds

Name	Formula
Ammonium chloride	NH_4Cl
Ammonium bromide	NH_4Br

#Hydrogen Bond

- The electrostatic force of attraction between hydrogen atom (which is covalently bonded to a highly electronegative atom) and any other electronegative atom which is present in the same or different molecules, is known as hydrogen bond.
- It is maximum in the solid state and minimum in the gaseous state.
- Intermolecular H-bonding (e.g. HF, water (H_2O) molecule)It occurs between different molecules of a compound and results in increasing solubility in water and high boiling point.

#Intramolecular H-bonding

- It occurs within different parts of a same molecule and results in decreasing solubility in water and low boiling point.(e.g. o-nitrophenol)

#Van der Waals' Forces

- The ability of geckos (lizard) which can hang on a glass surface using only one toe to climb on sheer surfaces had been attributed

to the Van der Waals forces between these surfaces and their foot-pads



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